

TASK 5 REPORT – SECONDARY SCREENING¹

This report describes the secondary screening of methodologies selected by the preliminary screening in task 4. Methodologies examined are CREAMS-WT, Phosphorus Budgets, and the Florida Phosphorus Index. Scoring criteria and the scoring system used were developed during task 2.

In the following table, the first column lists methodologies selected for further consideration by the task 4 deliverable. Key words identify evaluation categories in subsequent columns. See the task 2 deliverable for a complete description of each category.

Methodology	Category 1 - BMPs	Category 2 - Results	Category 3 - Documentation	Category 4 - Regulation	Total Score
CREAMS-WT	5	5	4	5	19
Florida Phosphorus Index	3	4	4	2	13
Phosphorus Budgets	4	4	2	4	14

CREAMS-WT

Category 1: A score of 5 was assigned, because the methodology has been used extensively to evaluate BMPs in the Lake Okeechobee watershed. Evaluations were conducted with the intention of managing land use change impacts on nutrient loading to the lake. The methodology can simulate various BMPs on a long-term continuous basis.

Category 2: A score of 5 was assigned in this category, because methodology results are easily reproducible.

Category 3: A score of 4 was assigned, because the methodology is well documented from a user perspective and in the peer reviewed literature. Because CREAMS-WT has been extensively used to evaluate BMP effectiveness, parameterizations of various BMPs have been developed and documented. However, this information needs further synthesis for use by end-users. District staff also have extensive experience with the methodology.

Category 4: A score of 5 was assigned, because the methodology can predict the impact of land use changes on phosphorus loadings. Within this context, CREAMS-WT has been used in the Lake Okeechobee watershed as a regulatory tool.

Florida Phosphorus Index

Category 1: A score of 3 was assigned, because the Florida Phosphorus Index is insensitive to conditions in the Lake Okeechobee watershed. The methodology has a soil erosion component, and erosion is not important in the watershed. As a result, the methodology cannot effectively evaluate BMP impacts on phosphorus loadings. This problem can be remedied with proper modifications to the phosphorus index.

¹ This report is based on a memorandum submitted as the task 5 project deliverable by R. Srinivasan.

Category 2: A score of 4 was assigned, because the methodology uses tables and charts to evaluate land use change, and results are reproduced easily. However, results may not be reproducible for new BMPs and land use management practices unless additional documentation is developed.

Category 3: A score of 4 was assigned, because the methodology is well documented with examples of applications. However, examples are for areas outside of the Lake Okeechobee watershed. District staff also do not have expertise with this methodology.

Category 4: A score of 2 was assigned, because methodology documentation states that it should not be used as a regulatory tool. National Resource Conservation Service approval is required for use as a regulatory tool.

Phosphorus Budgets

Category 1: A score of 4 was assigned, because the methodology can account for BMP impacts. However, lower net phosphorus imports do not necessarily imply that loadings are less. If a proposed land use has lower net imports, but greater surface runoff, phosphorus loading may increase. Thus, reduced runoff also must be demonstrated if a conclusion of reduced phosphorus loading is to be made. Methodologies for estimating runoff include the rational formula and curve number method.

Category 2: A score of 4 was assigned, because standard phosphorus import and export values have been developed for a number of land uses in the Lake Okeechobee watershed. However, values may not exist for some land uses, or land uses that have yet to be introduced in the watershed. When new values are developed, procedures will need to be clearly documented. Otherwise, District staff will have difficulty reproducing results generated by another party.

Category 3: A score of 3 was assigned, because the methodology has limited documentation. Thus, documentation should be expanded, particularly if the methodology is used in the future to estimate the effects of land use change on phosphorus loadings. District staff has experience with this methodology.

Category 4: A score of 4 was assigned, because the methodology draws upon a large amount of information taken from past phosphorus loading studies in the Lake Okeechobee watershed. However, additional work will be needed with land use activities and BMPs that previously have not been examined.

Recommendations

Based on the above screening, each methodology potentially can estimate relative changes in edge-of-field phosphorus loadings associated with land use changes. Further, having the option to choose from more than one methodology based on a particular problem offers advantages over having only one available methodology. For straightforward problems, a simple methodology may be best from the perspective of time and resources needed for implementation. However, more difficult problems would require a more sophisticated methodology to handle complexities that a simple methodology cannot address. Thus, a tiered approach is proposed, in-which either the Florida Phosphorus Index or Phosphorus Budgets methodology constitutes the first, or simplest, methodology for examining the impact of land use changes on edge-of-field phosphorus loads. If the first methodology fails to demonstrate reduced phosphorus loads due to a land use change, the second tier methodology, CREAMS-WT, will be used in the analysis.

The EPA uses a similar approach to evaluate potential risks from pesticides on receiving water bodies. In a draft report on their tiered approach (ECOFARM Aquatic Report, EPA Task Group, 1999), the EPA states *“The purpose of a tiered process is to provide a logical progression of tests and risk assessment approaches to address the potential risks of toxicants to aquatic systems. The common feature of all tiered regulatory processes is a progression beginning with conservative assumptions and moving toward more realistic estimates. Tiered processes tend to be cost effective in that they ensure that resources are expended on pesticide products/issues meriting attention.”* In their approach, the EPA uses a very simple screening procedure as a tier one approach, and progresses to a very complex modeling framework as the tier four approach. At each stage of the assessment, if pesticide toxic levels do not violate water quality standards based on the intended use of the receiving water body, no further analysis is necessary, and the pesticide is approved for its intended use. However, if the pesticide fails to meet pre-specified criteria in a given tier, the next tier methodology is implemented.

Similarly, a two-tiered approach is recommended for estimating land use change impacts on edge-of-field phosphorus loads. The Phosphorus Budgets methodology, with the recommended capability of estimating surface runoff, will be the tier one screening tool, and CREAMS-WT is the tier two methodology. The Phosphorus Budgets methodology was selected, because the Florida Phosphorus Index received a slightly lower score and was not developed for regulatory purposes. CREAMS-WT was selected for tier two, because it is the most sophisticated of all three methodologies. With the Phosphorus Budgets methodology, relative differences in edge-of-field loads for existing and proposed land uses only can be inferred. Thus, to conclude that one land use generates lower phosphorus loads than the other, net phosphorus imports and surface runoff must be less for that land use. If these conditions are not met, CREAMS-WT must be used to compare edge-of-field loads for the two land uses. If CREAMS-WT predicts lower edge-of-field phosphorus loads for a proposed land use, then it can be concluded that a land use change will result in lower loads to downstream receiving waters.